

Claims

1. An induction melting furnace for heating a melt and discharging a metered amount of the melt, the induction melting furnace comprising:

5 a feed chamber having a sealable supply opening for placing a charge of the melt in the feed chamber, the feed chamber having a sealable delivery opening;

a melt chamber for heating the melt in the melt chamber, the melt chamber connected to the feed chamber by the sealable delivery opening, the melt chamber having a melt chamber outlet for discharge of the melt;

an at least one induction coil at least partially surrounding the melt chamber;

10 a meter chamber having a meter chamber inlet and a meter chamber outlet, the meter chamber inlet connected to the melt chamber outlet by a connecting passage;

a means for opening and closing the connecting passage to control the flow of the melt through the connecting passage; and

15 a means for opening and closing the meter chamber outlet, whereby opening the connecting passage while the meter chamber outlet is closed fills the meter chamber with the melt, and opening the meter chamber outlet while the meter chamber is filled with melt and the connecting passage is closed discharges a metered amount of the melt from the meter chamber through the meter chamber outlet.

20 2. The induction melting furnace of claim 1 wherein a magnetic field created by a flow of an ac current in the at least one induction coil inductively heats the melt chamber whereby the heat induced in the melt chamber heats the melt in the melt chamber by conduction.

3. The induction melting furnace of claim 1 wherein a magnetic field created by a flow of an ac current in the at least one induction coil inductively heats the melt in the melt chamber.

25 4. The induction melting furnace of claim 1 further comprising an at least one meter chamber induction coil at least partially surrounding the meter chamber.

5. The induction melting furnace of claim 4 wherein a magnetic field created by a flow of an ac current in the at least one meter chamber induction coil inductively heats the meter chamber whereby the heat induced in the meter chamber heats the melt in the meter chamber by conduction.

30 6. The induction melting furnace of claim 4 wherein a magnetic field created by a flow of an ac current in the at least one meter chamber induction coil inductively heats the melt in the meter chamber.

7. The induction melting furnace of claim 1 wherein the meter chamber is detachably connected to the melt chamber.

8. The induction melting furnace of claim 1 further comprising a preheater for preheating the charge prior to placing the charge in the feed chamber.

5 9. The induction melting furnace of claim 1 further comprising a gas system whereby a gas can be selectably supplied to or withdrawn from the feed chamber; selectably supplied to the melt chamber; and selectably supplied to or withdrawn from the meter chamber.

10. A method of heating a melt and discharging a metered amount of the melt, the method comprising the steps of:

- 10 placing the melt in a melt chamber having a melt chamber outlet;
surrounding the melt chamber at least partially with a one or more induction coils;
flowing an ac current through the one or more induction coils to inductively heat the melt chamber or the melt in the melt chamber;
connecting an inlet of a meter chamber to the melt chamber outlet by a melt chamber
15 outlet valve;
connecting an outlet of the meter chamber to a meter chamber outlet valve;
closing the meter chamber outlet valve and opening the melt chamber outlet valve to fill the meter chamber with melt from the melt chamber; and
closing the melt chamber outlet valve and opening the meter chamber outlet valve to
20 discharge the metered volume of melt in the meter chamber.

11. The method of claim 10 further comprising the step of selectively flowing the ac current through the one or more induction coils to inductively heat selected regions of the melt chamber or melt in the melt chamber.

12. The method of claim 10 further comprising the step of connecting a tuning capacitor in
25 parallel with one of the one or more induction coils to form a tank circuit and magnetically coupling the induction coil in the tank circuit with at least one of the other one or more induction coils to induce the ac current in the tank circuit.

13. The method of claim 10 further comprising the steps of surrounding the meter chamber at least partially with an at least one meter chamber induction coil and flowing an ac current through
30 the at least one meter chamber induction coil to inductively heat the meter chamber or the melt in the meter chamber.

14. The method of claim 10 further comprising the steps of:

placing a charge of the melt in a sealable feed chamber, a feed chamber outlet sealable

connected to the melt chamber;

sealing the feed chamber; and

delivering the charge to the melt chamber through the feed chamber outlet.

15. The method of claim **14** further comprising the steps of:

5 injecting a gas into the volume above the melt in the melt chamber;

injecting the gas into the feed chamber to approximately the same pressure of the gas injected into the volume above the melt in the melt chamber before delivering the charge to the melt chamber;

10 withdrawing the gas from the feed chamber after delivering the charge to the melt chamber;

injecting the gas into the meter chamber when the melt chamber outlet valve is closed and the meter chamber outlet valve is opened to displace the metered volume of melt discharging from the meter chamber; and

15 withdrawing the gas from the meter chamber when the melt chamber outlet valve is opened and the meter chamber outlet valve is closed to permit filling of the meter chamber with melt from the melt chamber.

16. The method of claim **15** further comprising injecting the gas withdrawn from the meter chamber into the volume above the melt in the melt chamber.

20 17. The method of claim **14** further comprising the step of preheating the charge before placing the charge in the sealable feed chamber.